Planning Subsystem

Jolyon Martin

jolyonm@eos.hitc.com

ECS Release A SDPS/CSMS Critical Design Review
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Agenda

- **Overview**
- **Context**
- **Subsystem Breakdown**
- **Software Components**
- **Scenarios**
- **Hardware Components**
- **Scalability and Evolvability**
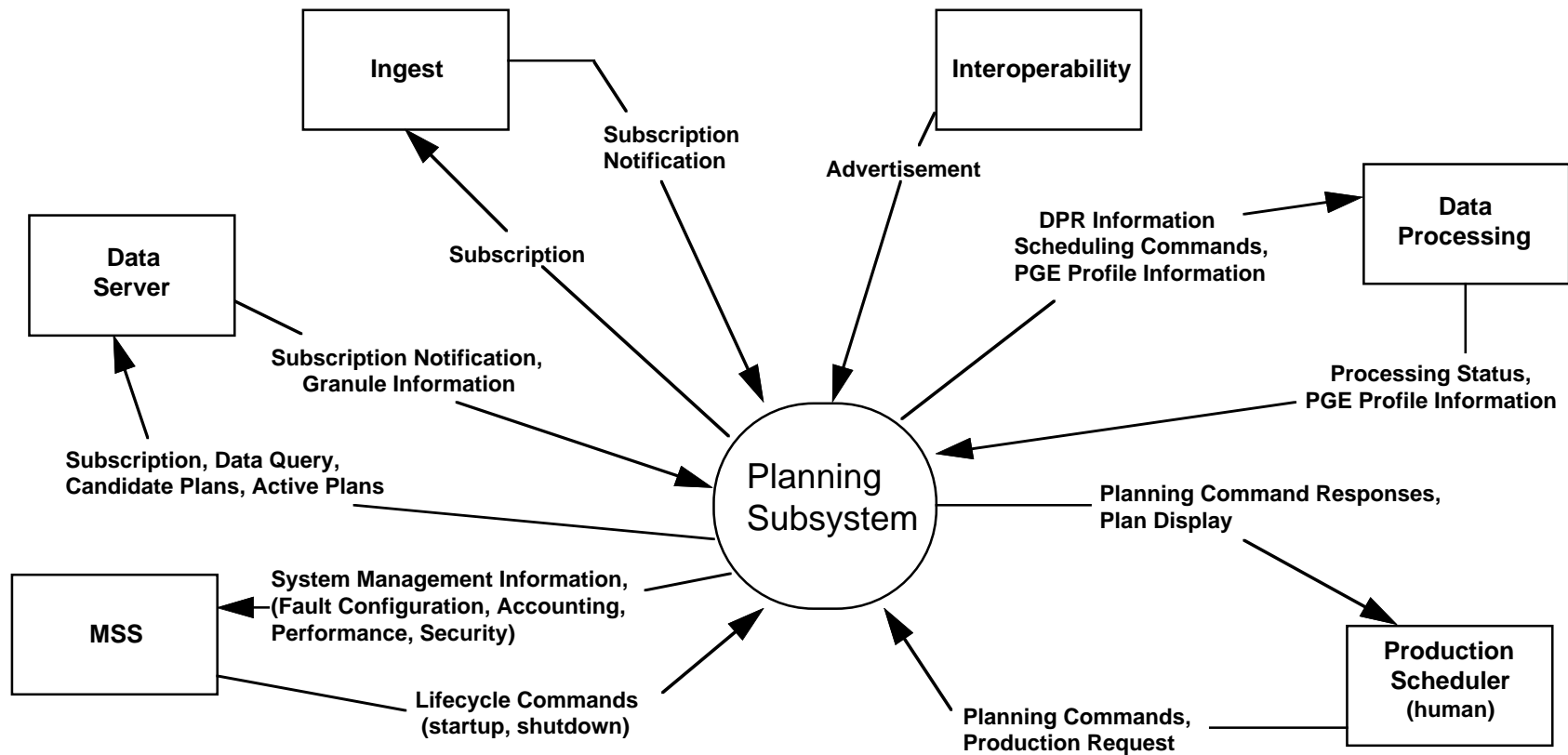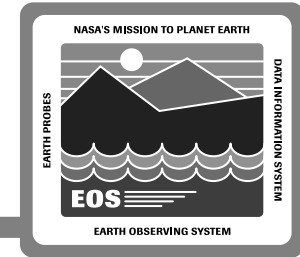- **Issues and Recommendations**

Overview

Planning subsystem provides the capabilities for:

- Describing Production Goals
- Forecasting Schedules for Production
- Coordinating the production within ECS as prescribed by goals and schedule

Context

Ingest
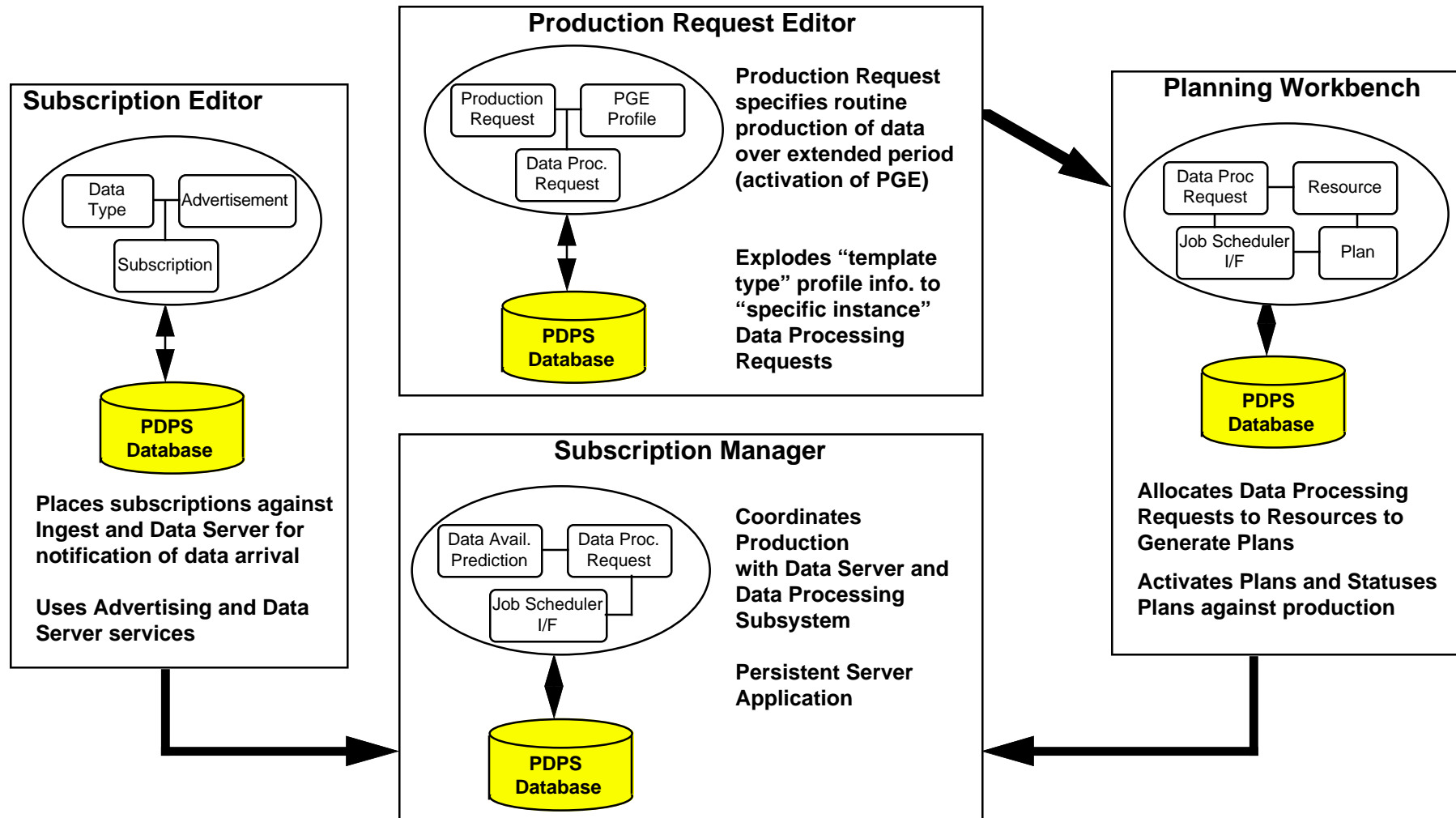
Interoperability

Data Server

Data Processing

Subscription Notification

Advertisement

Subscription

DPR Information Scheduling Commands, PGE Profile Information

Subscription Notification, Granule Information

Processing Status, PGE Profile Information

Subscription, Data Query, Candidate Plans, Active Plans

Planning Subsystem

Planning Command Responses, Plan Display

System Management Information, (Fault Configuration, Accounting, Performance, Security)

MSS

Lifecycle Commands (startup, shutdown)

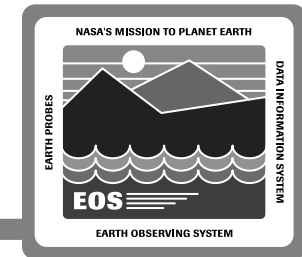**Planning Commands, Production Request**

Production Scheduler (human)

Subsystem Decomposition
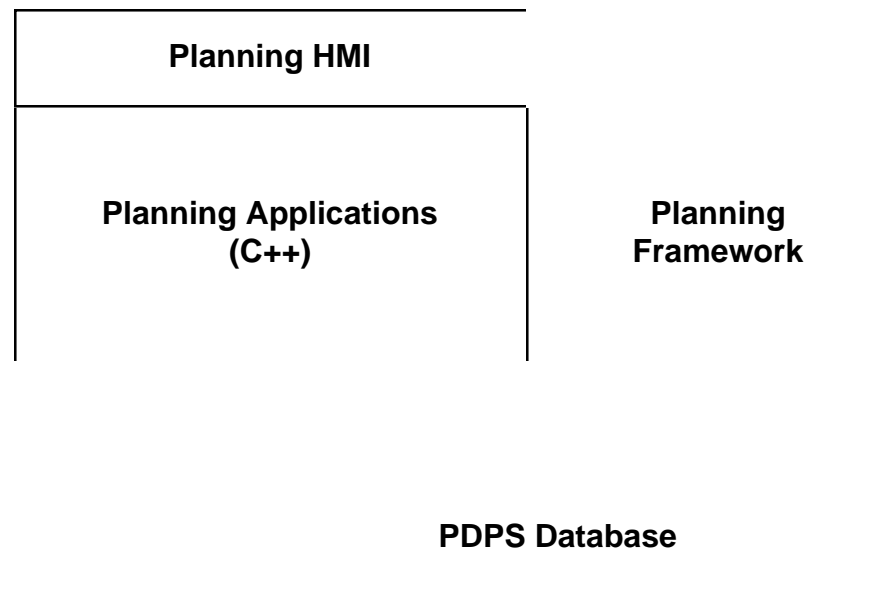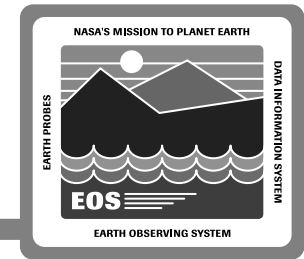
PLANNING Subsystem (PLS) Release A Capabilities

- **PLANG CSCI**
    - **Planning Data Management**
    - **Production Request Processing**
    - **Production Plan Generation**

        For Production Tasks and Ground Events
    - **Production Coordination**
    - **External/Internal User Support**
    - **System Management Support**
- **PLNHW HWCI**
    - **CPU and Disk Resources to support Planning Software**
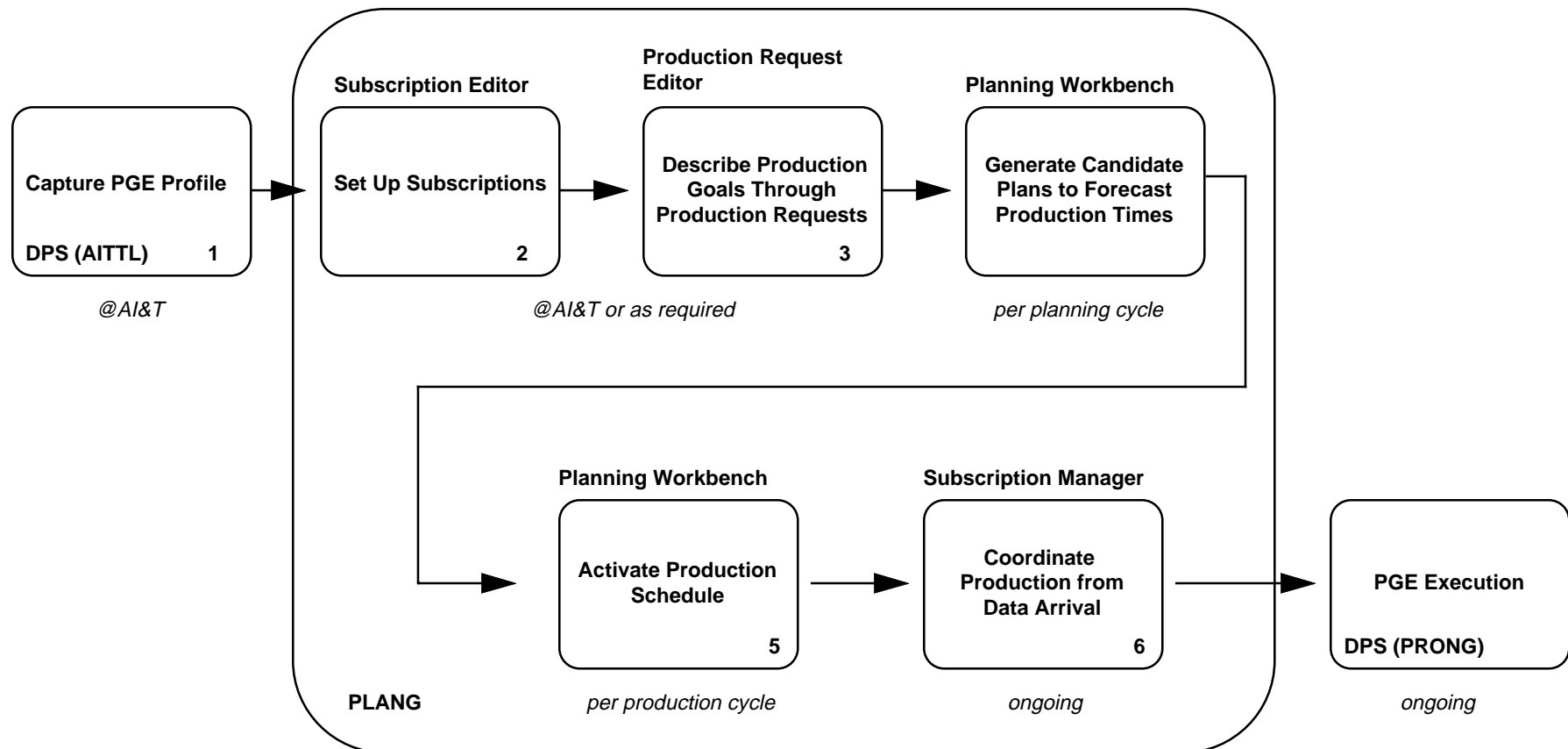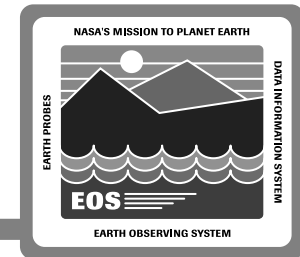   - **Fault Tolerance**

PLANG Components

Production Request Editor

Production Request
PGE Profile
Data Proc. Request

PDPS Database

Production Request specifies routine production of data over extended period (activation of PGE)

Explodes "template type" profile info. to "specific instance" Data Processing Requests

Subscription Editor

Data Type
Advertisement
Subscription

PDPS Database

Places subscriptions against Ingest and Data Server for notification of data arrival

Uses Advertising and Data Server services

Planning Workbench

Data Proc Request
Resource
Job Scheduler I/F
Plan

PDPS Database

Allocates Data Processing Requests to Resources to Generate Plans

Activates Plans and Statuses Plans against production

Subscription Manager

Data Avail. Prediction
Data Proc. Request
Job Scheduler I/F

PDPS Database

Coordinates Production with Data Server and Data Processing Subsystem

Persistent Server Application

Architecture

Planning HMI

Planning Applications (C++)

Planning Framework

PDPS Database

Planning Use Case Scenario

Capture PGE Profile

DPS (AITTL)   **1**

@AI&T

Subscription Editor

Set Up Subscriptions

    2

Production Request Editor

Describe Production Goals Through Production Requests

    3

@AI&T or as required

Planning Workbench

Generate Candidate Plans to Forecast Production Times

per planning cycle

Planning Workbench

Activate Production Schedule

    5

PLANG   *per production cycle*

Subscription Manager

Coordinate Production from Data Arrival

    6

ongoing

PGE Execution

DPS (PRONG)

ongoing

1. Capture PGE Profiles

PGE Profile describes the data needed by the planning subsystem

- **PGE Info**
- **Input Data Types - and "requirement"**
- **Output Data Types - and "yield"**
- **Resource Requirements**
- **Performance Statistics**
- **User Parameters**

Planning provides APIs to AITTL for DB storage of Profile

Supports TRMM Activation Rules at Release A
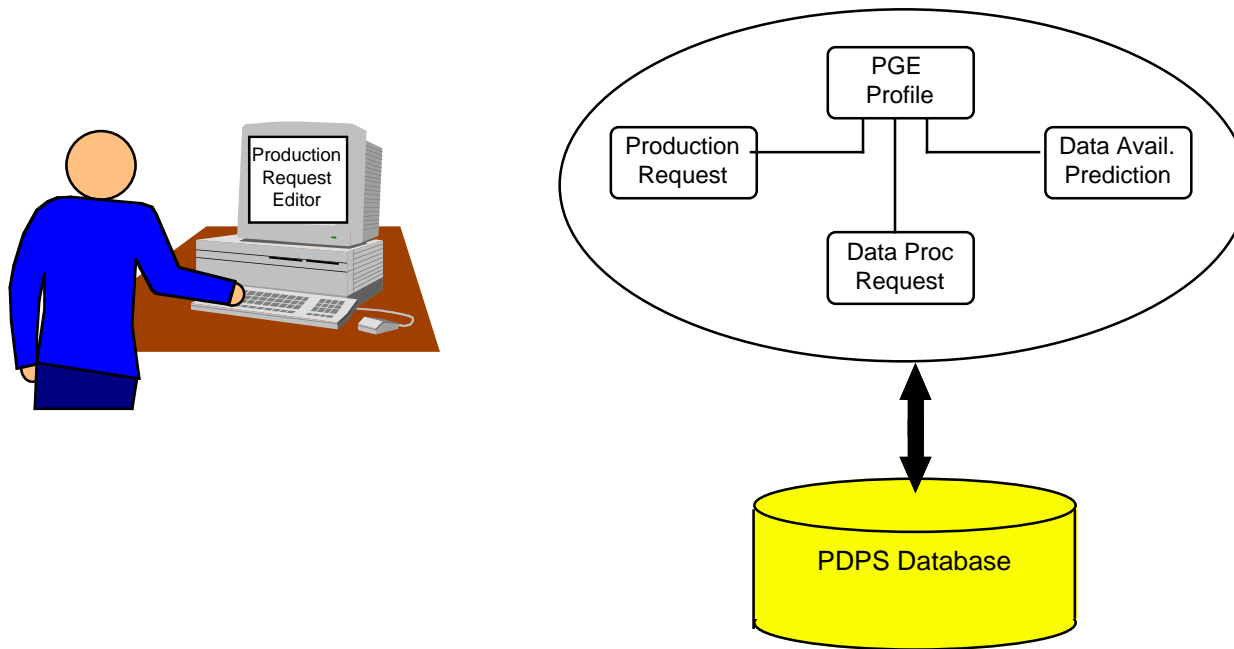
Modeling data used from AHWGP

2. Set Up Subscriptions
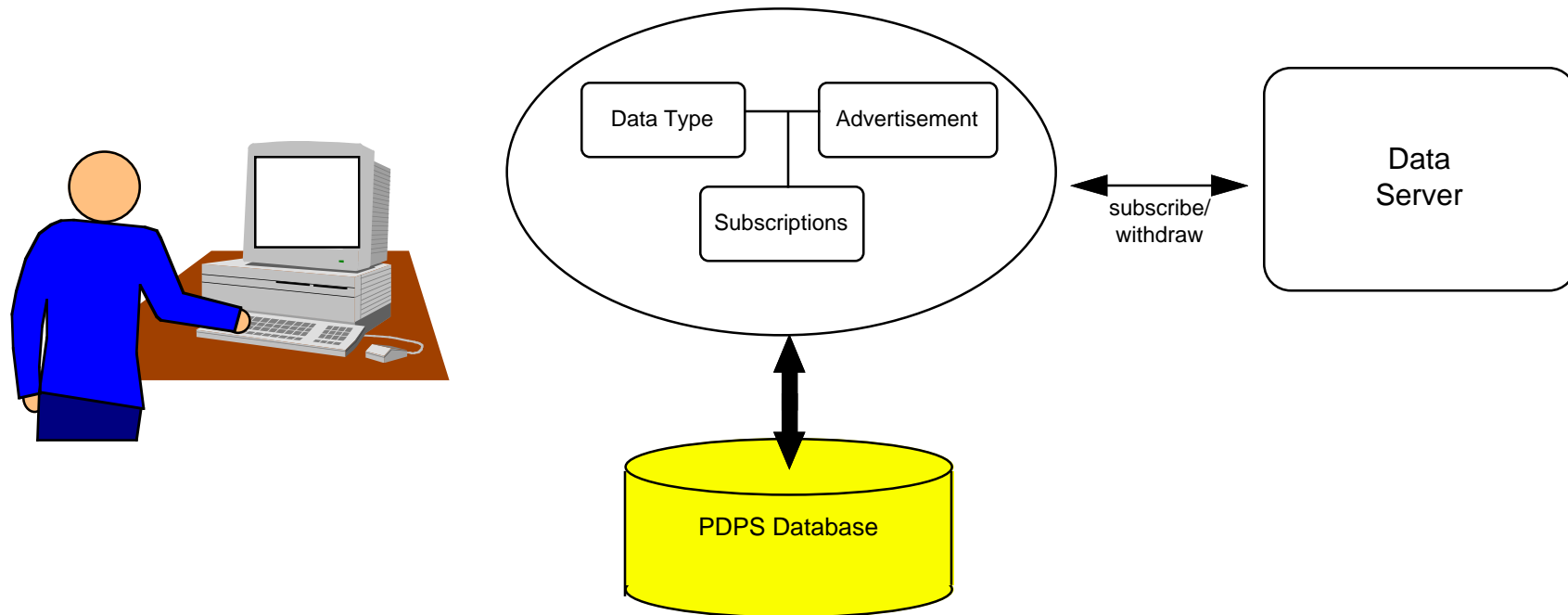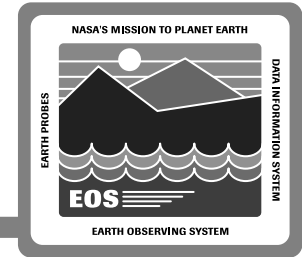
- **Subscriptions support the Data Driven aspects of ECS production**
- **Planning Subscription Editor Application is mainly re-use of Advertising/Data Server services**
- **Data Type information part of PGE Profile**

3. Entry of Production Requests

- **Production Requests specify**
  - **routine production of data over extended periods**
  - **or activation of PGE over extended periods**
- **Production Request "exploded" into many Data Processing Requests**
- **Translation of "template type" profile information to "specific instance" DPR information**
- **Grouping of multiple requests in later release**
- **Editor provides capabilities to Review / Modify Data Processing Requests**
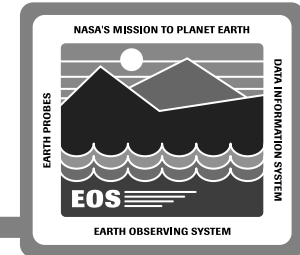
4. Generating Candidate Plans
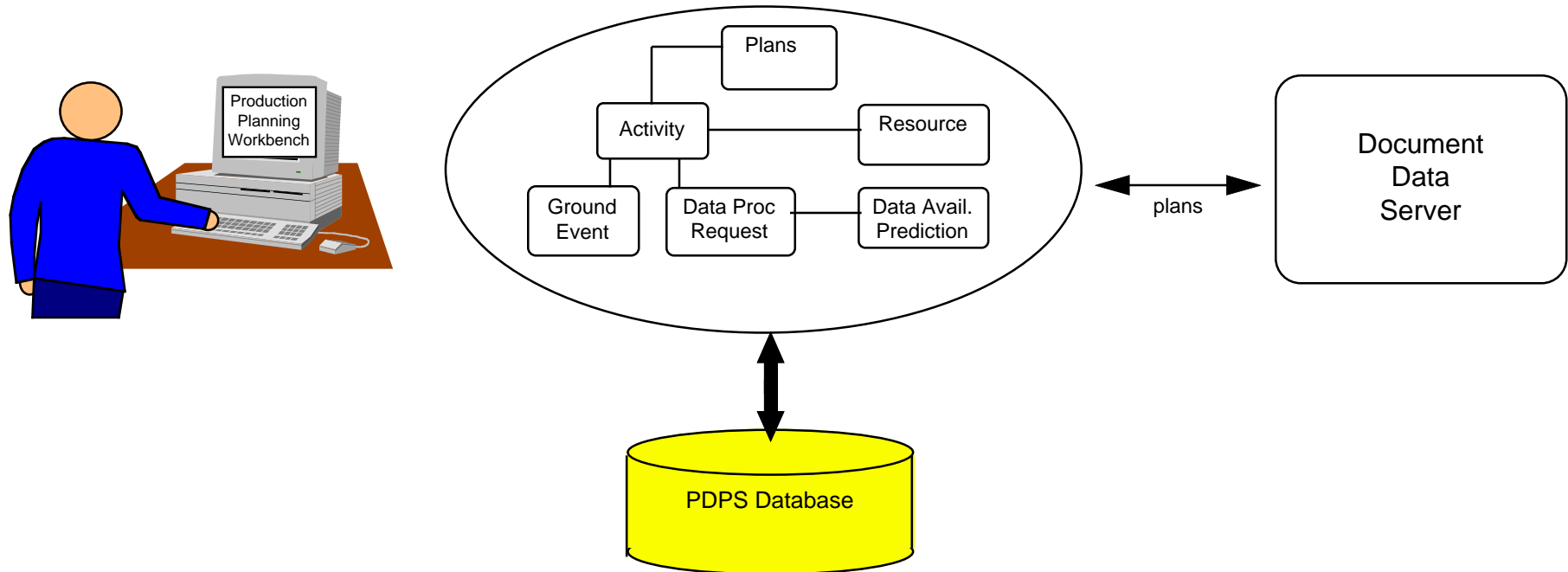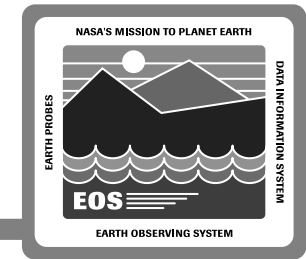
"What If / Candidate Planning" - based on priorities, preferences
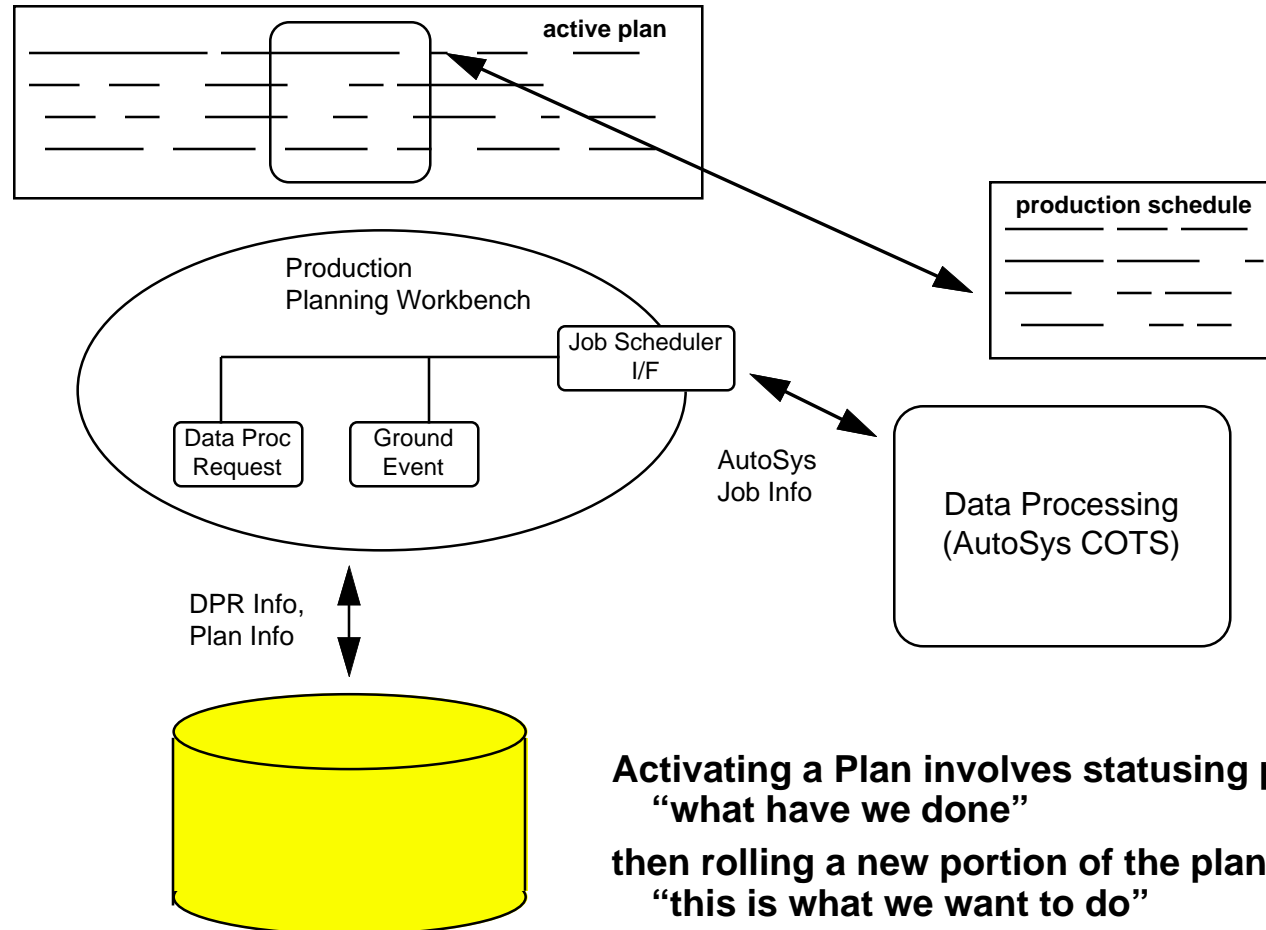- **Predicts execution times for data processing requests and ground events**
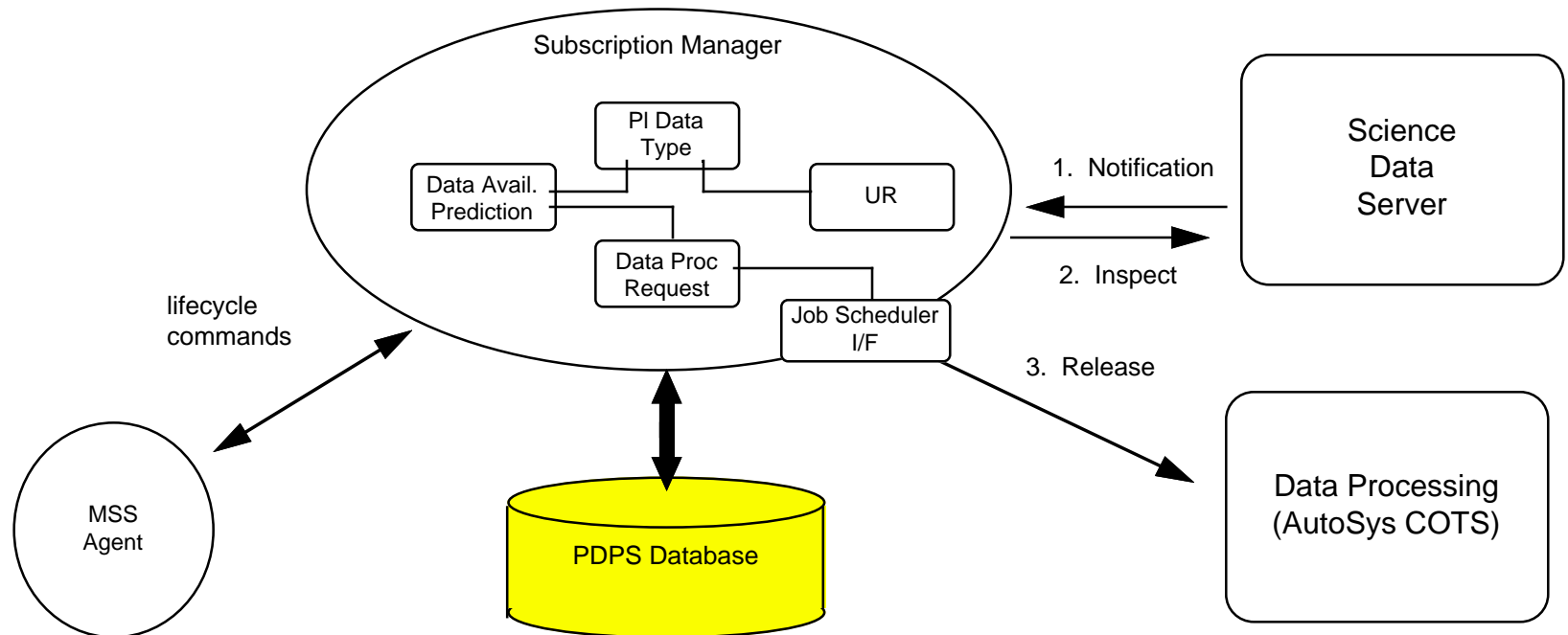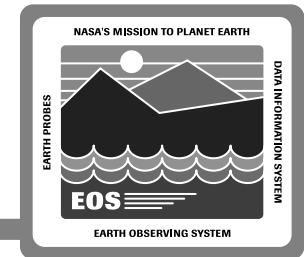
GUI & Report Statistics summarize plans for OPS

Plans are available for external view via document data server

5. Activating a Plan

active plan

production schedule

Production
Planning Workbench

Job Scheduler
I/F

Data Proc
Request

Ground
Event

AutoSys
Job Info

Data Processing
(AutoSys COTS)

DPR Info,
Plan Info

Activating a Plan involves statusing production "what have we done"

then rolling a new portion of the plan into AutoSys "this is what we want to do"

6. Coordinating Production

Subscription Manager

PI Data Type

Data Avail. Prediction

UR

1. Notification

Science Data Server

2. Inspect

Data Proc Request

Job Scheduler I/F

3. Release

lifecycle commands

MSS Agent

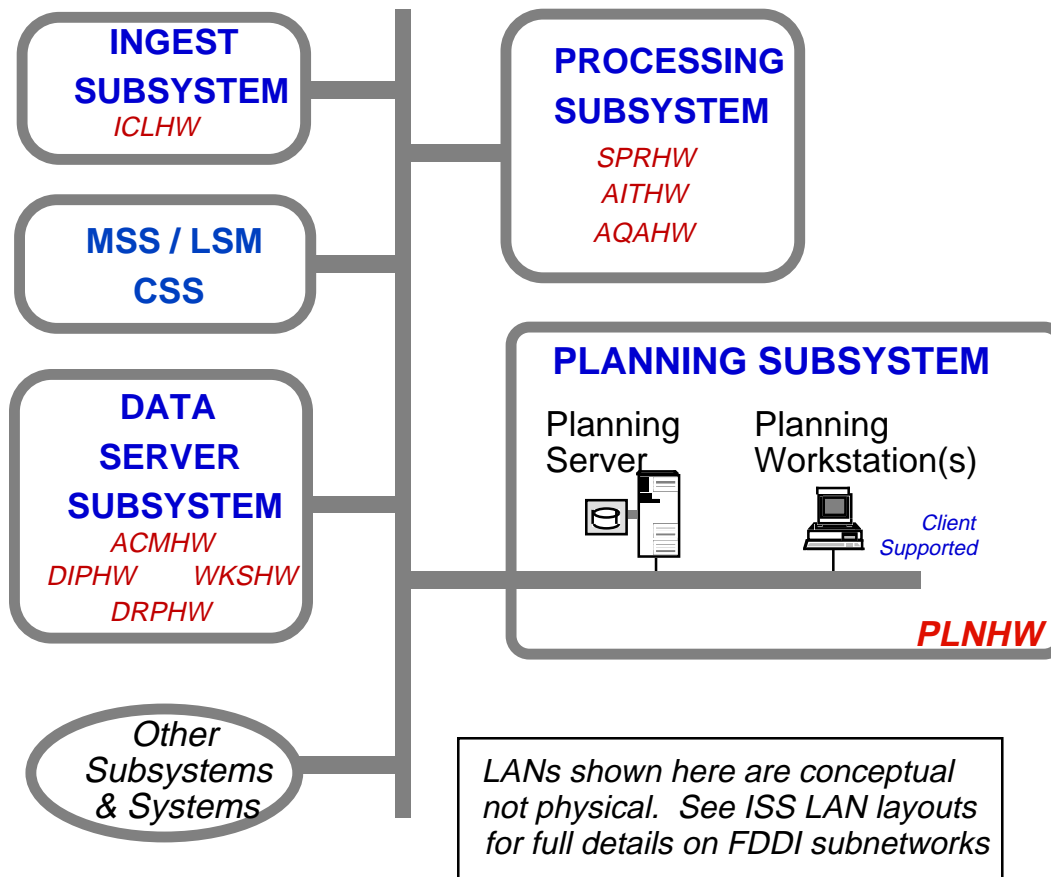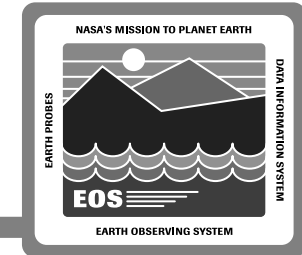PDPS Database

Data Processing (AutoSys COTS)

Subscription Manager manages ECS Data Dependencies and converts to AutoSys Job Dependencies

Checks Quality Thresholds for input Data

Uses CSS guaranteed asynchronous message passing

Hardware

INGEST SUBSYSTEM
ICLHW

MSS / LSM
CSS

DATA SERVER SUBSYSTEM
ACMHW
DIPHW   *WKSHW*
DRPHW

Other Subsystems & Systems

PROCESSING SUBSYSTEM
SPRHW
AITHW
AQAHW

PLANNING SUBSYSTEM

Planning Server

Planning Workstation(s)

Client Supported

PLNHW

LANs shown here are conceptual not physical. See ISS LAN layouts for full details on FDDI subnetworks

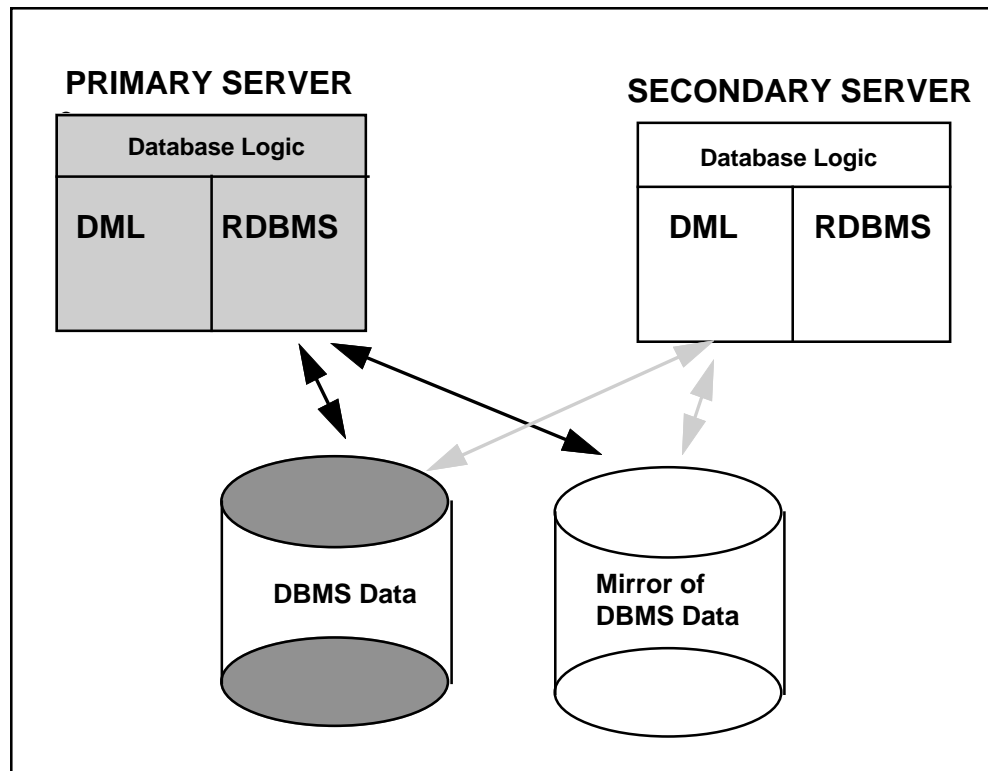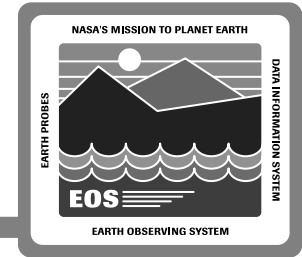**Planning Hardware sizings: per-DAAC and for Release B.**

Planning DBMS Server Hosts:
- **PDPS Database**
- **Subscription Manager**
- **MSS Agents**

Production Planner Workstation Hosts:
- **Subscription Editor**
- **Production Request Editor**
- **Planning Workbench**
- **MSS Agents**

Failover

PRIMARY SERVER

Database Logic	
DML	RDBMS

SECONDARY SERVER

Database Logic	
DML	RDBMS

DBMS Data

Mirror of
DBMS Data

High Level Picture of PLS fault tolerance and recovery

- **Sybase mirrors data writes to protect data in case of disk crash**

- **Secondary server provides availability in case of server crash**

- **CSS provides "store and forward" guaranteed message passing for planning subscription notification**

PLS integrated with fault management

[CD-305-001-001 Appendix A]

Scalability & Evolvability

Release A Planning Subsystem provides framework for Release B and beyond

Additional PGE Types

- Planning OO classes easily specialized to support new activation rules

Increased Processing Volume

- AutoXpert provides abstractions to provide meaningful displays for large numbers of processing jobs

Cross-DAAC dependencies

- AutoSys/AutoXpert federated approach to multi-site planning and scheduling in next (Feb.) release

On-Demand production

- Can build on class libraries and COTS

Issues and Recommendations

Planning Workbench CSC - Framework Selection Outstanding

Approach identified: Delta Design Review Scheduled

- **Operability, Evolvability and Risk evaluation in progress**